data representing a computation for calculating the processed image data corresponding to the input image data by interpolation using output data of grid points of the multi-dimensional look-up table corresponding to the input image data, and the obtained value, wherein the interpolation is executed by an integral operation.

13. to 23. Canceled.

REMARKS

Claims 1, 3 to 6, 11 and 12 are pending in the application, with Claims 2, 7 to 10 and 13 to 23 having been cancelled, and with Claims 1, 4 to 6, 11 and 12 having been amended herein. Claims 1, 6, 11 and 12 are the independent claims. Reconsideration and further examination are respectfully requested.

Claims 1 to 23 were rejected under 35 U.S.C. § 103 over U.S. Patent No. 5,883,821 (Komaki) in view of U.S. Patent No. 5,390,035 (Kasson). Reconsideration and withdrawal of this rejection are respectfully requested.

Applicant has amended the claims to more clearly define the invention. Support for the conversion of image data as described in the claims is provided in the specification and figures, particularly with respect to Figure 9. The feature of normalizing the value used in interpolation is supported at page 12, lines 3 to 6 of the specification. In addition, support for amended Claim 4, regarding the grid positions, is provided in Figure 6 and at pages 14 to 18 of the specification.

In general, the invention is directed to efficiently and precisely perform image data conversion by using interpolation processing by using an integral operation to

perform the interpolation. In this manner, a floating-point operation is not used in the interpolation process, thereby avoiding complicated and inefficient processing. In addition, calculation error is suppressed in the integral operation to precisely perform the interpolation processing by normalizing the value which represents a distance from input image data to a grid position of a multi-dimensional look-up table by a sufficiently large value. In this manner, calculation error is suppressed while still utilizing an efficient interpolation process during image date conversion.

Turning to specific claim language, amended independent Claim 1 is directed to a data conversion method of performing image processing on image data expressed in plural components by using a multi-dimensional look-up table, and outputting processed image data. The method includes the steps of setting grid positions of the multi-dimensional look-up table, obtaining a value which represents distance from input image data to a grid point of the multi-dimensional look-up table, and which is normalized by a sufficiently large value, obtaining output data of grid points of the multi-dimensional look-up table which corresponds to the input image data, and calculating the processed image data, which corresponds to the input image data, by interpolation using the obtained output data and the obtained value, wherein the interpolation is executed by an integral operation.

The applied art, namely Komaki and Kasson, is not seen to disclose or suggest the foregoing features of amended independent Claim1, particularly with respect to obtaining a value which represents distance from input image data to a grid point of the multi-dimensional look-up table, and which is *normalized* by a sufficiently large value, obtaining output data of grid points of the multi-dimensional look-up table which

corresponds to the input image data, and calculating the processed image data, which corresponds to the input image data, by interpolation using the obtained output data and the obtained value, wherein the interpolation is executed by an *integral operation*.

Komaki is generally seen to be directed to interpolation processing which uses a arithmetic expression that corresponds to a position of input data in a divided segment of an interpolation space. (Komaki, abstract; Figures 3 and 38; and column 3, lines 13 to 22). Komaki is seen to divide an interpolation space into a plurality of segments, and then to use an arithmetic expression during interpolation processing to determine a position of a particular one of the divided segments that corresponds to input data. (Komaki, Figures 38; column 13, lines 17 to 67; and column 14, lines 1 to 35).

However, Komaki is not seen to disclose os suggest the use of an *integral operation* in the interpolation process, or the *normalization* of a value which represents distance from input image data to a grid point of the multi-dimensional look-up table, with a sufficiently large value. Accordingly, Komaki is not seen to utilize integral operations to efficiently perform interpolation processing, and normalization to suppress calculation during such interpolation processing.

In this regard, Kasson is not seen to remedy the foregoing deficiencies of Komaki. In particular, Kasson is seen to be directed to color conversion using a multi-variable function by dividing the input domain into polyhedra segments. (Kasson, abstract; Figures 5 and 14; column 7, lines 5 to 68; column 8, lines 1 to 68; and column 9, lines 1 to 45). Although the term "normalization" is mentioned in Figure 16 of Kasson, Applicant submits that this has nothing to do with the *normalization* of a value which represents distance from input image data to a grid point of the multi-dimensional look-up table, with

a sufficiently large value, as in amended independent Claim 1. The mention of normalization in Figure 16 of Kasson concerns the display of normalized interpolation errors *resulting* from three different interpolation methods, including the interpolation method disclosed in Kasson and two prior-art methods. (Kasson, Figure 16; column 22, lines 46 to 52). These interpolation errors were normalized for comparison purposes in Figure 16 of Kasson. Nowhere is Kasson actually seen to utilize a normalization process *during the interpolation process*, as in amended independent Claim 1, so as to reduce interpolation error. In contrast to the present invention, the interpolation method of Kasson, which is not seen to use a normalization step, results in an interpolation error as shown in the normalized interpolation errors of Figure 16. The remaining art of record has been reviewed and is not seen to remedy the foregoing deficiencies of Komaki and Kasson with respect to amended independent Claim 1.

Accordingly, Applicant submits that the applied references, whether alone or in combination, for which no motivation or suggestion is seen, is not seen to disclose or suggest the elements of amended independent Claim 1. Applicant therefore submits that a *prima facie* case of obviousness has not been established with respect to amended independent Claim 1. M.P.E.P. § 2143.

Based on the foregoing, amended independent Claim 1 is believed to be in condition for allowance and such action is respectfully requested. In addition, amended independent Claim 6 is directed to a data conversion apparatus, amended independent Claim 11 is directed to a computer program product storing computer program codes, and amended independent Claim 12 is directed to a computer readable medium with recorded data, all of which include substantially similar features as those of amended independent

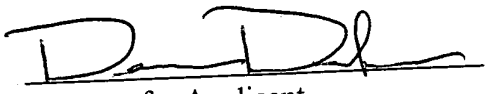
Claim 1. Accordingly, amended independent Claims 6, 11 and 12 are also believed to be in condition for allowance for the reasons discussed above with respect to amended independent Claim 1.

The other pending claims in this application are each dependent from the independent claims discussed above and are therefore believed patentable for the same reasons. Because each dependent claim is also deemed to define an additional aspect of the invention, however, the individual consideration of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, the entire application is believed to be in condition for allowance, and such action is respectfully requested at the Examiner's earliest convenience.

Applicant's undersigned attorney may be reached in our Costa Mesa, CA office at (714) 540-8700. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE TO CLAIMS

1. (Amended) A data conversion method of performing image processing on image data expressed in plural components by using a multi-dimensional look-up table, and outputting processed image data, comprising the steps of:

setting grid positions of the multi-dimensional look-up table;

obtaining [outputting] a value which represents distance from [an] input image data [value] to a grid point of the multi-dimensional [a] look-up table, and which is normalized by a sufficiently large value;[, using]

obtaining output data of grid points of the multi-dimensional look-up table which corresponds to the input image data; and

calculating [executing] the processed image data, which corresponds to the input image data, by interpolation using the obtained output data and [conversion of] the obtained [input] value, wherein the interpolation is executed by an integral operation [interpolating the value obtained by the look-up table].

2. Canceled.

3. (Not Amended From Previous Version) The method according to claim 1, wherein the sufficiently large value is a power of 2.

4. (Amended) The method according to claim 1, wherein [positions of] the grid points are set in non-uniformity, and the grid positions corresponding [point are equal] to each of the components are set the same [other in all input dimensions].

5. (Amended) The method according to claim 1, wherein the input [value is] image data is expressed in one of RGB, CMY, and XYZ color spaces.

6. (Amended) A data conversion apparatus for performing image processing on imgae data expressed in plural components by using a multi-dimensional look-up table, and outputting processed image data, comprising:

a setting section, arranged to set grid positions of the multi-dimensional look-up table;

a first obtaining section, arranged to obtain [storage means for storing a table, that outputs] a value which represents distance from a grid point of the multi-dimensional [a] look-up table to [an] input image data [value], and which is normalized by a sufficiently large value[, with respect to the input value];

a second obtaining section, arranged to obtain output data of grid points of the multi-dimensional look-up table which corresponds to the input image data; and

a computation section, arranged to calculate the processed image data, which corresponds to input image [means for executing] data, [conversion of the input value] by interpolation using [interpolating] the [value] obtained output data and the obtained value, wherein the interpolation is executed by an integral operation [the look-up table].

7. to 10. Canceled.

11. (Amended) A computer program product storing [comprising] a computer readable medium having a computer program code, for a data conversion method of performing image processing on image data expressed in plural components by using a multi-dimensional look-up table, and outputting processed image data, the product comprising process procedure codes for:

setting grid positions of the multi-dimensional look-up table;

obtaining [a normalization process procedure code for outputting] a value which represents distance from [an] input image data [value] to a grid point of the multi-dimensional [a] look-up table, and which is normalized by a sufficiently large value;[,]

obtaining output data of grid points of [using] the multi-dimensional look-up table which corresponds to the input image data; and

calculating the processed image data, which corresponds to the input image data, by interpolation using the obtained output data and [a conversion process procedure code for

executing data conversion of] the obtained [input] value, wherein the interpolation is executed by an integral operation [interpolating the value obtained by the look-up table].

12. (Amended) A computer readable medium storing recorded data which is used in [a] data conversion processing to process[, the] image data expressed in plural components by using a multi-dimensional look-up table, and to output processed image data, the recorded data comprising:

data for indicating grid positions of the multi-dimensional look-up table;

table data for obtaining [outputting] a value which represents distance from a grid point of the multi-dimensional [a] look-up table to [an] input image data [value], and which is normalized by a sufficiently large value[, with respect to the input value]; and

data representing a computation for calculating the processed image [executing] data corresponding to the input image data by interpolation using output data of grid points of the multi-dimensional look-up table corresponding to the input image data, and [conversion of] the obtained [input] value, wherein the interpolation is executed by an integral operation [interpolating the value obtained by said look-up table using the value obtained by said table data].

13. to 23. Canceled.